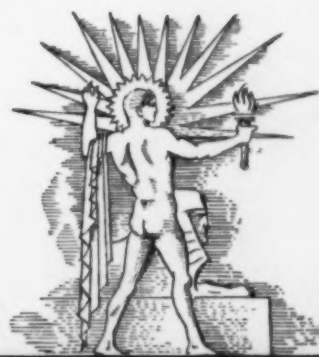


PRICE
15¢

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



NOVEMBER 30, 1935

Salt for America's Breakfast
See Page 340

A

SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXVIII

No. 764

The Weekly



Summary of

Current Science

Published Every Saturday by

SCIENCE SERVICE

THE INSTITUTION FOR THE POPULARIZATION OF SCIENCE organized 1921 as a non-profit corporation, with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the journalistic profession.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Canadian subscribers please add 50 cents a year, foreign subscribers 75 cents a year to regular subscription rate to cover postage.

Members of the American Association for the Advancement of Science have the privilege of subscribing to SCIENCE NEWS LETTER at the reduced price of \$3 per year. Application for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington, D. C.

In requesting change of address, please give your old address as well as the new one in notification to Circulation Department, SCIENCE NEWS LETTER, 2101 Constitution Ave., Washington, D. C., at least two weeks before change is to become effective.

Copyright, 1935, by Science Service, Inc. Reproduction of any portion of the SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Publication Office, 1930 Clifton Ave., Baltimore, Md., Editorial and Executive Office, 2101 Constitution Ave., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienservc, Washington. Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Advertising rates furnished on application.

Member Audit Bureau of Circulations.

Board of Trustees of Science Service

Honorary President, William E. Ritter, University of California. Honorary Vice-President, Vernon Kellogg, National Research Council. Representing the American Association for the Advancement of Science, J. McKeen Cattell, President, Editor, Science, Garrison, N. Y.; Burton E. Livingston, Johns Hopkins University, Baltimore, Md.; Henry B. Ward, permanent secretary, A.A.A.S. Representing the National Academy of Sciences, W. H. Howell, Vice-President and Chairman of Executive Committee, Johns Hopkins University, Baltimore, Md.; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; Harlow Shapley, Director, Harvard College Observatory, Cambridge, Mass. Representing National Research Council, Ludvig Hektoen, John McCormick Institute for Infectious Diseases, Chicago, Ill.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry, Washington, D. C. Representing Journalistic Profession, John H. Finley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, Harry L. Smithton, Treasurer, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio.

Staff of Science Service

Director, Watson Davis; Staff Writers: Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, Robert Potter; Astronomy writer, James Stokley; London correspondent, Donald Caley. Correspondents in principal cities and centers of research. Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

DO YOU KNOW?

Next to Japan, Brazil has the largest number of Japanese residents.

Hawaii's great pineapple industry has grown up in the past forty years.

Papago Indians of the Southwest used to make pets of coyotes, captured young.

Horses and mules are again in demand for farms, and about 900,000 colts will be produced this year, it is estimated.

In the Field Museum, Chicago, are bows of different sizes used in eighteenth century China especially to test a man's strength.

Ovens and also families in American homes being smaller than in grandma's day, government scientists are trying to develop smaller-bodied turkeys for the market.

A certain kind of yucca tree of the Southwestern desert popularly goes by the name Joshua tree, one explanation being that Mormon pioneers compared the pointed leaves to Joshua pointing them toward the promised land.

A new electric typewriter invented in Germany runs on a new electro-magnetic principle.

Dry ice is being used in India to ship fish into the interior during the bad weather of the monsoon season.

Yellow dye for many American khaki uniforms in the World War was obtained from inner bark of oak trees.

When moths go after soiled spots on clothing, they may be hunting a more complete diet with adequate vitamin B.

It is found that when lettuce shipped to the West Indies is wrapped in cellulose film, losses which previously were as high as 50 per cent. are checked.

The English poet Tennyson is said to have consulted the Astronomer Royal when in any doubt over a statement about sun or stars to be used in a poem.

Although glass came into general use for windows in the eighteenth century, it was not until the past decade that window lighting became a carefully studied science.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

ARCHAEOLOGY

What scientific use may have been made of ancient Mexico's underground caves? p. 347.

ASTRONOMY

Where can you see an eclipse of the sun at midnight? p. 346.

BIOLOGY

How can one creature put on the natural armament of another? p. 342.

CHEMISTRY

To what extent could gasoline resources be increased by polymerization? p. 344.

ENGINEERING

What are the strength requirements for pipe in deep oil wells? p. 345.

What new material is used in airplane runways? p. 344.

ENTOMOLOGY

Are ants always virtuous? p. 341.

FORESTRY

How many young trees are on hand for the 1936 shelterbelt plantings? p. 344.

GENERAL SCIENCE

How can science provide the means for eliminating war? p. 345.

MEDICINE

Does cobra venom have a use in medicine? p. 344.

How is vaccine for spotted fever made? p. 339.

In what way do the health habits of the Abyssinians, Arabs, and Hindus differ? p. 342.

MINING

Can air be used to blast out coal? p. 344.

PHYSICS

How far out into space does the magnetic field of the earth extend? p. 340.

How is a machine able to record lightning strokes just before they occur? p. 348.

What is the speed record for a centrifuge? p. 341.

PHYSIOLOGY

What effect has hypnosis on brain waves? p. 348.

What is the best diet for an overweight child? p. 340.

PLANT PATHOLOGY

Is over-sensitiveness to disease always a handicap? p. 345.

PLANT PHYSIOLOGY

Is cellulose a uniform, homogeneous substance? p. 343.

PSYCHOLOGY-ENGINEERING

Why does a driver press on the accelerator when he is startled? p. 339.

PSYCHOLOGY-ENGINEERING

Driver's Own Reflex Act Throws Car "Out of Control"

Sudden Jolting Makes Anyone Stiffen Arms and Press With Feet; Safety Pedal is Recommended as Remedy

A NEW auto appliance to prevent ten per cent. of all serious automobile accidents such as that which took the life of Belgium's young queen was described by Dr. Yandell Henderson, Yale University professor of applied physiology, in a report to the National Academy of Sciences.

The device would prevent the type of accident now explained by the phrase "the car got out of control." In these accidents it is not the car but the driver that gets out of control, Prof. Henderson said. A self-preserving reflex action of the human body that "could not be eradicated in a million years" is what makes motor cars in perfect condition suddenly "get out of control."

The reflex action is a "self-righting reflex," much like that which causes a cat, no matter how it is dropped, to twist around and land on its feet. It occurs in all animals. Even a new-born baby has it. No training can eradicate it. It is a righting reaction to recover balance and regain support of the body. In the driver of a motor car, it may be brought into play by a jolt or by a start such as any driver may experience when he sees a child run into the street ahead of his car.

"Freezes" on Wheel

"When it occurs in the driver of a car," Prof. Henderson explained, "the impulse that dominates him is to steady himself in his seat. He grasps the wheel with his whole strength, his arms stiffen, and he is as likely to steer off the road as along it. Simultaneously and as part of the same nervous and muscular complex, he performs another act so instinctive that in many cases he is entirely unconscious of it. His legs are forcibly extended and his feet are pressed down hard.

"Any motorist, no matter how experienced, who is suddenly and severely jolted, instantly reacts to steady himself in his seat; and in so doing he presses his foot down hard on the accelerator pedal."

The result is that the car tears along at its highest speed, "out of control,"

until it runs into a tree, wall, over a ditch or overturns.

The remedy Prof. Henderson suggests is a safety pedal for the left foot at the spot where this foot normally rests when not on the clutch. Heavy pressure on this pedal, which would occur with the same reflex that drives the right foot down hard on the accelerator, should either counteract the pressure of the right foot on the accelerator and allow the throttle to close, or it should turn another butterfly valve in the carburetor and shut off the power.

This safety pedal would work because one of the characteristic and reliable features of the thrust of the legs in the self-righting reflex is that the two legs are always pushed forward and

downward together, Prof. Henderson explained.

By way of accustoming the motorist to the safety pedal, Prof. Henderson suggests that moderate pressure on it might be allowed to blow the horn.

Prof. Henderson described many accidents of the "car out of control" type which showed how the motorist himself was out of control due to this reflex.

Science News Letter, November 30, 1935

MEDICINE

Take Step Toward Better Spotted Fever Vaccine

THE FIRST step toward a simpler, cheaper and safer method of making a vaccine to protect against Rocky Mountain spotted fever seems to have been taken by U. S. Public Health Service scientists at the National Institute of Health.

Federal disease fighters at their Hamilton, Mont., laboratory have for some time been producing an effective vaccine for this usually fatal disease. This vaccine is made from infected ticks, the insects that transmit the disease. Production of the vaccine is difficult, costly and dangerous. Two of the men working



TIME ROUND THE WORLD

The U. S. Naval Observatory in Washington has just put into operation its new world time "wheel." Based on the measurement of time by the rotation of the earth, it is possible to set the wheel for a given hour at any part of the world and find out what time it is at any other part. Capt. Julius Hellweg, director of the Naval Observatory, is shown above adjusting the wheel.

with the vaccine at Hamilton lost their lives and a number have been seriously ill as a result of infection picked up in the course of their work with the spotted fever ticks.

The latest advance has been made by Dr. R. E. Dyer and Ida A. Bengtson, senior bacteriologist of the federal health service. These two have succeeded in growing the Rocky Mountain spotted fever virus on chick embryos. The latter substance is being used increasingly for cultivation of viruses and is now being used for the production of vaccine for smallpox.

Since the Rocky Mountain spotted fever virus can be grown and kept alive apparently indefinitely on chick embryo, it may be possible to prepare the protective vaccine directly from it. This

would eliminate the expense of keeping animals on which to grow the ticks and also the danger of an infected tick's escaping and biting either a laboratory worker or some other unsuspecting person in the neighborhood.

Because of the cost and difficulty of preparing the tick vaccine, the federal health service has never been able to supply all the vaccine wanted by ranchers, hunters and others exposed to the Rocky Mountain spotted fever ticks. The situation has become more acute since the discovery that ticks on the eastern seaboard and in other widely separated parts of the country are infected with the virus of this disease which is thus no longer confined to a small, sparsely populated area of the Far West.

Science News Letter, November 30, 1935

PHYSICS

Cosmic Rays Show Earth's Magnetic Field is Lopsided

DISCOVERY that the magnetic field of the earth is lopsided was announced by Dr. R. A. Millikan of the California Institute of Technology, before the meeting of the National Academy of Sciences. Dr. Millikan's wholly unexpected discovery comes as a result of studies on cosmic rays.

In attempting to discover the nature and distribution of cosmic rays, Dr. Millikan has changed the idea of the still-mysterious aura of magnetism that surrounds the earth.

He finds that the magnetic field extends into space to at least ten thousand miles from the earth's surface—far beyond the limits of the atmosphere.

The magnetic intensity is stronger on the side of the earth opposite to America. This is demonstrated by the fact that there is greater effect on the cosmic ray intensity, from the North Magnetic Pole to the Equator, in the region of India than there is in comparable latitudes in America.

Dr. Millikan's discovery has been discussed with the scientists who have studied magnetism during the past thirty-five years at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

A comparison of magnetic variations on the surface of the globe with those high above the earth, as determined by cosmic ray intensities, shows that the variations of magnetism on the earth extend outward many thousands of

miles. Dr. Millikan's results on terrestrial magnetism were obtained on the surface of the earth, and the extension of these results out into space was made by the use of simple laws of magnetism which govern such things as the running of an electric motor.

For the past hundred years, ever since the time of Karl Gauss, it has been assumed that the intensity of the earth's magnetic field was essentially uniform—a conclusion which is now revised by Dr. Millikan.

Science News Letter, November 30, 1935

ENGINEERING

Giant Salt Container Holds Twenty-Five Tons

THE COVER of this week's SCIENCE NEWS LETTER shows a new 25-ton salt evaporator just completed for one of the largest salt manufacturers. Within it a bronze propeller stirs up wet salt and circulates it through more than 800 tubes where the water is distilled off.

The Lincoln Electric Co., which supplied the picture, states that the apparatus is fifty feet high and twelve feet in diameter at its largest point. Arc welding construction was used throughout.

Science News Letter, November 30, 1935

A new kind of popcorn in Mexico is said to pop to extra-fat limits, and is believed to be the descendant of an old Indian grain variety.

PHYSIOLOGY

Dieting Improves Health Of Over-Fat Children

OVERWEIGHT or obesity is so often associated with "middle-age spread" and "corporation front" that its occurrence in children is apt to be ignored. It is so easy to say, "Oh, my people are all fat like that," and to attribute to the ductless glands the blame for such overweight.

Just as often the family eating habits are at fault. That such is the case is well shown by a report of Drs. Hannah Mulier and Helen Topper of the Pediatric Service of Mt. Sinai Hospital, N. Y., who gave "slimming" treatment to 25 overweight boys and girls not only without harm but with marked improvement in general health as well as in weight.

To do this required careful adaptation of the diet to fill the needs of the child. Not only must the diet furnish enough energy for the internal needs of the body organs and glands, but also for growth and for the child's activities. It must also be low enough to force the body to consume some of its own excess fat.

These doctors therefore gave relatively large amounts of protein foods, such as meat, eggs and cheese, to insure continued normal growth; with but small amounts of sugars and starches, and larger amounts than customary of the bulky foods, such as vegetables and fruits.

Too Much Rich Food

All of the children treated had a history of over-feeding with rich foods, fats, sweets and pastries, and of high water and milk intake. Since some of the overweight of obesity is due to the retention of water by the body tissues, especially when a high carbohydrate diet is eaten, fluids were limited to 15 or 20 ounces daily, and salt not to exceed 15 grains, because it, too, is concerned with water storage in the body.

Increased participation in outdoor sports, swimming, walking, tennis, was gradually encouraged, and the results were well worth the effort taken. Not only did the children lose some of their excess fat, averaging three-quarters of a pound loss per week, but they continued to make more than the normal gain in height for children of their age, 5 to 14 years. They lost their passion for excessive food, became much more interested in work and school study and outside activities, and manifested an increased sense of well-being and alertness. In addition, some of them who

had developed a sense of inferiority because of their excessive fatness which kept them from engaging in the usual activities of their group, lost this attitude and became normal healthy children with an active interest in their surroundings.

Examination revealed no evidence of

disturbance of the ductless glands as a cause of obesity, and the steady loss in weight under dietary treatment confirms the belief of the authors, as of other observers on obesity, that overweight is usually due not to gland disturbances but to over-eating plus under-activity.

Science News Letter, November 30, 1935

PHYSICS

Rotors Whirling at 16,000 Miles an Hour for Atom Study

Scientific Counterpart of the Cream Separator Used To Separate Heavy Isotopes from Lighter Ones

THE CREAM separator, that takes cream out of milk by high-speed whirling, has a smaller but vastly faster scientific counterpart in a 16,000-mile-an-hour centrifuge at the University of Virginia. This device, which develops a centrifugal force equivalent to seven million times gravity, is to be used in an effort to separate chemical isotopes, which are different-weight atoms of the same chemical elements.

Reporting to the National Academy of Sciences meeting, Dr. J. W. Beams, University of Virginia physics professor, told of adapting his high-speed air-driven apparatus to the new highly important atom problem.

Dr. Beams' rotor device can spin in a vacuum and attain velocities as high as 21,000 revolutions a second, or a rim speed of over 16,000 miles an hour. At these speeds the centrifugal forces produced are in excess of seven million times the force of gravity.

The only limit to the speed of rotation, Dr. Beams indicated, is the strength of the rotor. Under the great centrifugal force, the spinning metal may fly apart.

So hazardous is the research with little four-inch diameter rotors that it is carried on behind a barricade consisting of a wall of sand four inches thick held in place by 1½-inch thick wood planks. For larger rotors, still more protection is needed.

Describing the separation of isotopes, Dr. Beams said:

"Because of the new methods recently found by many different experimenters for disintegrating the atoms, it is very important to obtain samples of the various pure isotopes so that the results of the atomic disintegrations can be clearly analyzed. At the present time we are undertaking this problem of separating isotopes, and the method is brief-

ly outlined although no results are as yet ready to be reported.

"Isotopes have the same atomic number but different atomic weights. Therefore in a centrifuge the heavier isotopes settle out under the intense centrifugal force faster than the lighter ones.

"In addition to separation by centrifuging, the rotor is made to select the heavier molecules of a gas or vapor directly. This is easily accomplished because the velocity of a molecule depends upon the square root of its mass. Since the peripheral velocity of the rotor can be made greater than the average molecular speed of most substances, the rotor can easily be set at such a speed that, roughly speaking, only the faster (lighter) molecules can enter a hole on the periphery."

Science News Letter, November 30, 1935

ENTOMOLOGY

New-Found Ant Species Are "Racketeer" Aristocrats

PARASITIC ants of a new species, recently discovered in southern Germany by Dr. Karl Gösswald of the Institute for Applied Zoology, Munich, set a new record for insect racketeering. If Solomon could have seen these insects, he might have hesitated about making a blanket commendation of ants in general as models of industry and thrift.

This ant's career of wickedness begins when a fertile queen intrudes herself into the nest of another species of ant—the normal, hardworking kind that inspired Solomon's praise. Ordinarily the workers in the nest would make short work of any stranger, but she somehow manages to flatter herself into their good graces.

Proceeding thus unmolested to the



LOOKS INNOCENT

But the rotor within this housing, whirling at 16,000 miles an hour, produces such centrifugal force that the metal may fly apart. Scientists working with it "take cover" behind a barricade of sand.

chamber of the rightful queen, the invader springs upon her back and fastens her strong jaws into the body of the much larger insect. The home queen does nothing to defend herself, and the workers still pay no attention.

After the rightful queen is dead, the invading queen is accepted by the duped workers as their own. She proceeds to lay eggs of her own parasitic species, which are cared for by the workers.

These eggs produce "neuters" or undeveloped females, which in a normal ant species constitute the worker caste. But in this parasitic species they are as useless as their mother, living lives of complete idleness, accepting the food the active workers bring them and giving no thanks for it—as typical a lot of alien aristocrats as ever afflicted a community, whether ant or human.

It might be expected that when the last of the workers had died off, the helpless parasites would perish. But here the nature of the "host" ant workers intervenes to play a mean trick on them and perpetuate their slavery.

Normally, when an ant colony loses its queen, some of the usually "sexless" workers lay unfertilized eggs, just as worker bees do under similar circumstances. Such unfathered bee eggs develop only male or drone insects, useless as workers. But with these poor afflicted ants, the eggs laid by the workers produce new workers, so that the "aristocratic" idle parasites always have a full population of exploitable "proletariat" workers to take care of them.

Science News Letter, November 30, 1935

MEDICINE

Doctor Tells of Conditions in Hospital at Addis Ababa

Varied Patients Include Native Abyssinians, Arabs, Hindus, Mohammedans, Europeans and Americans

AN UNUSUAL picture of conditions in a hospital in Addis Ababa as it appeared to a missionary doctor was read by Dr. Louis Faugeres Bishop, Jr., of New York City, at the meeting of the American Society for Tropical Medicine.

The conditions were described in a letter from Dr. Tesla C. Nicola of Zauditu Memorial Hospital of the Seventh Day Adventist Mission. Dr. Bishop had asked Dr. Nicola for information on the prevalence of heart disease.

Dr. Nicola's letter is not the catalogue of tropical diseases which makes up most reports on health conditions in Ethiopia. It is, instead, a one-doctor-to-another description of conditions and difficulties of hospital work in the Ethiopian capital. He writes, in part:

"I am sorry to say that we do not have statistics on the matter you are interested in (heart disease). That is, I cannot refer to individual cases from our records. The reason for this is that we are too new. The hospital has been in operation less than two years, and for several months there were no records kept. I have been here a little over a year myself. While we do keep a record now we do not have the cases classified so that the material is available. We have been too busy with the mass of details in getting a place like this started. It is quite different from a similar proposition in America.

Beds Filled

"However, we are adding to our help and I believe that should the request be repeated at some later date we will be able to serve you better. This is a 50 bed hospital and so far we are averaging about 50 a day. Our patients are as varied as could possibly be the case anywhere. There are the native Abyssinians. These are made up of the Amharas, Gallas, Somalis and other tribes all quite distinct. Our next largest class is the Arab. These have settled in here extensively. Then come the Hindu and the Mohammedan, which are here in large numbers. In addition to these we have a number of Europeans and a few

Americans. The Europeans, so-called, are the Greeks and Armenians.

"The native Abyssinian eats a large amount of meat, usually raw. He also uses an alcoholic drink which is intoxicating. He does not smoke. The Arabs are heavy smokers for the most part but do not drink much here. The Indians are divided, as you probably know. The Hindu does not eat any meat or eggs and for the most part does not smoke or drink any liquor. The Mohammedan uses both or rather all three. I mention these facts as they have been interesting to me (and to us). They are all factors which we have been used to considering as having influence on disease.

Little Heart Disease

"Now as to the specific disease of coronary thrombosis: There are two physicians on the staff here and I have talked with the other man. We do not recall that either of us have seen a case in over a year. We do not have an electrocardiographic machine. However we see very little of any heart disease. That is especially true among the natives. We have seen several thousand natives in the past several months. This does not include those that were simply dressing cases. There has been a case of endocarditis now and then. The few cases of cardio-vascular-renal disease we have had have been in foreigners. At present we have three such in the hospital. One is a Greek man about 38 years old, another an Armenian woman about 65 years old and the third came in last evening and is a Negro man about 55 who came here from Jamaica three or four years ago.

"Our immediate vicinity, as is also true of most of Ethiopia, is not really tropical except in latitude. We are about 8,500 feet altitude. The temperature ranges between 58 and 65 degrees. It never gets hot though at times there is frost. I came here from California and I believe the climate is quite the same except it does not get as hot here as where we were in Los Angeles.

"Postmortem examinations are practi-

cally impossible to get here due to the ignorance of the people. The only one I have been able to do so far was on a woman who died after a blow or kick from another woman and the friends wanted to know what the cause of death was. The woman was not entered as a patient but the body had been brought for a diagnosis. They had the idea that we could view the remains and tell the cause of death. It was only by promising that only a little cut would be made and no charge that it was possible to get this opportunity. This case of course is not in your line but I mention it because it is interesting and it shows the difficulty of getting autopsies."

Science News Letter, November 30, 1935

BIOLOGY

Worm Eats Small Enemy Merely to Get its Weapons

WARRIORS lacking weapons sometimes raid their enemies primarily for the sake of capturing their arms. Some of the most exciting tales of strife are based on such heroic thievings.

From the world of lesser animal life that struggles in the water, a similar tale was brought to the meeting of the National Academy of Sciences by Prof. W. A. Kepner of the University of Virginia, and his associates, Drs. W. C. Gregory and H. J. Porter.

The hero of this small zoological saga is a worm, known scientifically as *Microstomum*. Its enemy is a creature called *Hydra*, belonging to a still lower order on the evolutionary scale. They live in freshwater ponds and quiet streams.

Hydra possesses hundreds of little daggers, in the form of explosive stinging cells. With these it paralyzes and captures its prey, and also defends itself against enemies.

Microstomum has no such armament. It attacks, kills and eats *Hydra* for the sole purpose, apparently, of getting possession of the latter's stinging cells. *Hydra* cannot defend itself against *Microstomum's* attack, because the worm secretes a substance that protects it from the tiny daggers. Only when it unwittingly approaches *Hydra* is it vulnerable.

Once *Microstomum* has captured and eaten its enemy-victim, the stinging cells go through a most astonishing course. First, the white blood corpuscles of the worm, which move about in its body as freely as though they were tiny independent one-celled animals, take

charge of the cells. There are three types of these; and one of them, which is of no use to the worm, is digested and disappears.

The other two types of stinging cells, which are well adapted to *Microstomum's* defensive uses, are carried to the surface layers of the body, and there arranged into a formidable defensive armament by cooperation between the

white blood cells and the fixed cells of the body.

Thus *Microstomum* is given a complete borrowed armament, which aids in repelling its enemies.

This armament, moreover, is useful not only to the worm that first captures it, but can be passed on to its offspring even to the third and fourth generations.

Science News Letter, November 30, 1935

PLANT PHYSIOLOGY

Plants Build Walls With "Bricks" Made of Cellulose

Chains of Particles, Joined Together in Matrix Of Pectin, Demonstrated Through Use of Weak Acid

PLANTS build their walls in much the same manner that masons build brick walls. But plants are so skillful that when their walls are finished you cannot distinguish the bricks from the mortar. The first persons to see the bricks in plant walls and to learn the character of the mortar used in their construction, or indeed, to know that the walls were made of materials comparable to bricks and mortar, were Mrs. Wanda K. Farr of the U. S. Department of Agriculture, working at the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., with Dr. Sophia H. Eckerson, a staff member of that institution.

Since man first utilized fibers of the wild cotton plant, he has assumed that he was handling a uniform substance—cellulose. He has built up the huge cotton textile industry on this assumption. There are large numbers of workers throughout the world known as cellulose chemists and they have been working on this basis. True, cellulose chemists knew little enough about the stuff they worked with. They were unable to crystallize "cellulose," tell its melting point, dissolve it with any ordinary chemical solvents, give its structural formula or determine its molecular weight; but still they produced many important results. Botanists, too, have been assuming that cotton fibers were uniform and homogeneous.

At a round table discussion held at the American Institute in New York City, Mrs. Farr and Dr. Eckerson showed that in the protoplasm of the young cotton fibers as they develop there are large numbers of elliptical particles, remarkably uniform in size, separate or in bead-like strands lying approximately

parallel to the long axis of the young living fiber. Separate particles and short chains are found in the central part of the cell. In the outer portions the chains are longer, and often the particles are so closely compressed end to end that they have lost their separate identity. It is in this fashion that the cellulose spiral structure comes into existence. The final step in the process consists of the close appression of the fibrils to one another and to the outer membrane of the cell.

The final thickness of the cellulose wall depends upon the extent to which this formation and deposition takes place. Another interesting fact is that from its earliest stage each of the tiny particles is enveloped in a viscous film which serves to hold the particles together with an almost irresistible force; and once the fibril is formed, the points of juncture defy the strongest microscope. It is as if a brickmason had been so skillful that in his wall it were impossible to see where the bricks left off and where the mortar began.

The film about the particles is soluble in weak acids and alkalies, and its other chemical and physical properties led the speakers to believe that the cement which holds the particles together is composed largely of pectic or jelly-forming substance, though coming as it does from the living cell protoplasm it probably has traces of many other materials. The weight of this "cement" is probably not more than two per cent. of the weight of the whole fibril.

If the process of cellulose membrane formation takes place as described, the mature membranes should break down into fibrils and the fibrils in turn into particles identical with those seen in the



CELLULOSE "BRICKS"

Made visible for the first time through the technique of Drs. Farr and Eckerson, are units of structure of cotton, linen, wood and manifold other useful substances. Above are cotton fibers broken down by hydrochloric acid. Below are the individual cellulose particles magnified more than 1200 times

living cytoplasm. This was successfully accomplished by the use of strong hydrochloric acid. The cementing substance was almost instantly destroyed in this treatment and the cellulose particles fell apart.

The resulting particles were identical in size, shape, and properties with those which previously had been observed in the living protoplasm. X-ray pictures of the particles in the young cotton fiber and the particles obtained by the breakdown of the mature cotton fiber are conclusive evidence of their identity with pure cellulose. Now research workers know that cotton fibers are made up of two separate substances; cellulose particles and cementing material.

The speakers brought out the fact that they know nothing of how the protoplasm actually makes the cellulose particles but they are sure that "cellulose membranes" are not pure cellulose but particles of cellulose held together laterally and longitudinally by a pectic or jelly-like substance and that the cellulose particles can be separated from the pectic substance so that each in turn can now be studied.

Science News Letter, November 30, 1935

A silkworm's cocoon may unwind to a length of 600 yards.

The Euphrates River is nearly a mile wide where ancient Babylon stood.

MEDICINE

**Cobra Venom Stops Pain
But is Not Habit-Forming**

COBRA venom, in doses too small to be poisonous, relieves pain as effectively as morphine. But the venom of the death-dealing serpent is not habit-forming when given to relieve pain, as morphine is, and it does not produce the disagreeable and dangerous by-effects of the narcotic drug.

Experiments with cobra venom on laboratory animals and human patients, including a hundred sufferers from cancer in its late stages, were reported by Dr. David I. Macht, director of Pharmacological Research Laboratory, Hynson, Westcott and Dunning, Baltimore, at the meeting of the National Academy of Sciences. Dr. Macht was formerly lecturer in pharmacology at the Johns Hopkins Medical School.

Seventy-five of the cancer sufferers had their pain relieved by doses of cobra venom injected into the muscles, Dr. Macht reported.

The snake venom checks pain by acting on the higher nerve centers in the brain, he found from psychological and pharmacological studies.

Science News Letter, November 30, 1935

FORESTRY

**Tree Seeds Harvested by
Ton in Shelterbelt Area**

SHELTERBELT tree plantings in the Plains area are to be made in future from seedling descendants of trees already growing in the region and used to conditions there. At a meeting of biologists, Paul H. Roberts of the U. S. Forest Service told of a 1935 harvest of 57 tons of seeds and fruits of various Plains tree species, enough to supply 100,000,000 young trees for shelterbelt planting in future years.

Of this quantity, 85 per cent. came from trees in the shelterbelt area, 10 per cent. from trees in immediately adjacent regions in the West, and 5 per cent. from other sources, chiefly Chinese elm, a species claimed to be especially well adapted to cultivation in the West.

During the first shelterbelt planting season, just closed, 125 miles of shelterbelt were set out, besides 5,000 acres of farmstead tree plantings. Much of the stock, secured on an emergency basis from private nurseries, was not as suitable to the purpose as might have been desired, Mr. Roberts said, but even so,

between 70 and 85 per cent. of the plantings have survived.

There is in sight at present a total of 40,000,000 young trees for the 1936 planting campaign, enough for 1,400 miles of shelterbelt.

The entire area planned for shelterbelt development lies east of the "dust-bowl" region made famous—and obnoxious—by the great drought that reached its climax in 1934, Mr. Roberts explained.

Science News Letter, November 30, 1935

MINING

**Compressed Air Replaces
Dynamite in Coal Mining**

COMPRESSED air, rather than blasting dynamite, is the newest safety aid for coal mining now being tried out in the Indiana and Illinois coal fields.

Large pieces of coal of the so-called premium variety are now being politely pushed out of place by air pressure instead of being ruptured violently by dynamite or other permissible explosive.

There is no question about the value of the new method in raising mine safety, according to officials of the U. S. Bureau of Mines. There are no dangerous fumes liberated as in ordinary blasting. And more than that, the blast is highly localized at the point where it will do the most good.

In contrast, dynamite blasting is a fast and violent shock which not only breaks up the coal but puts a severe strain on the overlying rock structures. These, on occasion, break and drop rocks into the mine tunnels.

In practice, pneumatic mining consists of drilling a hole in the mine face, inserting a cylinder containing air compressed to as much as 15,000 pounds to the square inch, and the release of this pressure at will. Air at 15,000 pounds to the square inch is at a pressure comparable with that set up when a charge of dynamite is exploded.

Specially designed steel cartridges with a disk which ruptures at the operator's demand are used in storing the air. The cylinders can be used over again, according to engineers of the General Electric Company, which makes the electrical controls and motors for the compressing unit (*General Electric Review*, Nov.).

U. S. Bureau of Mines officials state that the technique is a real advance in mine safety and is adaptable not only in the mid-western coal fields but in the eastern Pennsylvania and West Virginia regions.

Science News Letter, November 30, 1935

IN SCIENCE

ENGINEERING

**Newark Airport to Get
Runway of Cotton Sheeting**

CONSTRUCTION of the world's first "cotton runway" will be undertaken next spring at the Newark Airport, it is announced by the Cotton-Textile Institute.

Cotton sheeting is already in use in the South in rural and secondary road construction where traffic is light. It is found to minimize erosion, cracking and wrinkling.

It takes from six to eight bales of cotton to construct each mile of an 18-foot road by the method. The Newark Airport installation will amount to about one mile and a half of such road.

Science News Letter, November 30, 1935

CHEMISTRY

**Polymerization Adds
To Gasoline Resources**

THE PROCESS of making gasoline out of natural gas and waste refinery gas, known chemically as polymerization, has increased the nation's potential sources of motor fuel by 25 per cent., it was reported to the American Petroleum Institute.

With efficiencies now obtainable approximately 110 million barrels of polymer gasoline could be produced each year if necessary, speakers at the meeting declared. This is roughly 25 per cent. of all the gasoline consumed in the nation in 1934.

Polymerization is the chemical process whereby waste refinery gases are made to combine in such a way that two or more molecules join and form a larger molecule, known as a "polymer." Not only gasoline can be secured in this fashion, but also benzol, toluol, and xylol, all important solvents.

The very volatile "tops" of natural gasoline and even natural gas can be polymerized. It is estimated that more than three billion gallons of gasoline, or about one-fifth of the annual consumption, is available from natural gas without curtailing the more than one trillion cubic feet available annually for other domestic and industrial uses.

Science News Letter, November 30, 1935

ENGINEERING FIELDS

ENGINEERING

Deep Oil Wells Tax Engineers' Ingenuity

GREATER demand for oil, leading to an increasing demand for oil wells 10,000 feet and more deep, is taxing the ingenuity of engineers, it was disclosed at the meeting of the American Petroleum Institute.

High pressures encountered at the extreme depths have added to the difficulty of finding pipe strong enough to lead the oil out, declared T. McLean Jasper of the A. O. Smith Corporation, Milwaukee, Wis.

The thickness of the pipe walls—the easier way to gain strength—cannot be increased indefinitely. Thick pipe means larger boring holes and is not economical for great depths. Already steel resisting pressures of 60,000 pounds to the square inch is needed at depths of 7,880 feet. For 10,000-foot wells steel pipes able to withstand 80,000 pounds to the square inch are used. For still deeper wells even stronger pipes are made by compressing the larger sizes into a smaller finished circumstance, resulting in pressure resistance of 95,000 pounds to the square inch.

Science News Letter, November 30, 1935

PLANT PATHOLOGY

Beans Resist Disease by Their Over-Sensitiveness

RESISTANCE to disease by being over-sensitive, not too tough, is the unusual phenomenon reported by Dr. S. A. Wingard of the Virginia Agricultural Experiment Station, before the meeting of the National Academy of Sciences.

Dr. Wingard has been seeking varieties of beans able to resist the attacks of the bean rust fungus. Some of his most promising varieties showed, upon microscopic examination, that their cells, instead of standing up against the attacking fungus threads, immediately collapsed, thereby giving the fungus little chance to form the propagating spores that would carry the epidemic farther. The surrounding cells thereupon formed layers of hard substance around the in-

fect spots, cutting them off and forming small sterile flecks.

"Hence, the so-called rust-resistant varieties owe their ability to resist the rust disease to their hypersensitiveness rather than to the property of true resistance or immunity," Dr. Wingard remarked. "For all practical purposes, this type of resistance is satisfactory because the rust fungus cannot produce spores in sufficient quantity on such plants to cause severe damage."

In rust-susceptible beans, a paradoxical situation was found. Here, the tissues invaded by the fungus formed a sort of gangster cooperative society with them, thriving better than the uninfected surrounding tissue, and feeding at the latter's expense. But after the fungus had exhausted itself by producing its spores, the bean tissue turned on it and ate it up: the devourer had become the devoured.

Science News Letter, November 30, 1935

PSYCHIATRY

Holland's Queen Approves Warning Against War

QUEEN Wilhelmina, ruler of the consistently neutral nation Holland, has expressed her approval of a warning against "war insanity" sent by psychiatrists of 30 nations to statesmen of the world.

Signed by 339 specialists in mental diseases, the document pointed out that the world is drifting towards a war psychosis, and that civilized 20th century man still possesses strong, fierce and destructive instincts which may break loose, when roused by the hypnotic speeches of leaders, and create chaos.

Queen Wilhelmina's "deep interest" in the document was expressed in a telegram to Dr. J. Roorda, honorary secretary of the Netherlands Medical Society's Committee for War Prophylaxis.

"This document, which tends to reflection," the queen's letter said, "has deeply interested me and I heartily agree with your practical and realistic point of view."

"I trust that this address will influence the mentality of peoples and statesmen. May God give that the different peoples, stimulated by clearer and sharper insight in the horrors of war, show themselves ready, in their own real interest to collaborate peacefully for the sake of humanity."

"This means a great task for the states, especially for those which are members of the League of Nations."

Science News Letter, November 30, 1935

GENERAL SCIENCE

Science May End War By Satisfying Hunger

REGARDLESS of the outcome of Italy's present drive to carve out for herself a place in the African sun, the present war may be the world's last war of conquest. Science may at last provide the means for making conquest unnecessary as religion and moral philosophy long ago made the idea of conquest abhorrent to normal-minded men.

Science promises to accomplish this longed-for end by enabling men to satisfy their hunger and other basic life-needs without encroaching on their neighbors' property and other rights, is the thesis set forth by Sir James Jeans, noted English physicist, in an essay published in the new annual report of the Smithsonian Institution, just off the press.

More than all other causes, hunger and the other needs of expanding populations drive nations to war, Sir James implies. If this cause drives, fear of the deadliness of "surprise" weapons in the hands of the enemy will not serve as an effective inhibition; nor is the possession of superior weapons on one's own part needed as an additional incentive.

Science is even now doing much to eliminate this potent cause of war by "enabling ever larger populations to live in comfort and contentment on the same limited area of land," Sir James contends. By the applications of science to the satisfaction of human needs, he says, "we may hope to restrain the pressure of population and the urge for expansion which, to my mind, are far more likely to drive the people of a nation to war than the knowledge that they—and also the enemies they will have to fight—are armed with the deadliest weapons which science can devise."

The problem of "technological unemployment" raised by the rapid application of science to production Sir James regards as curable on the principle of "using a hair of the dog that bit you." The remedy, in part at least, will come from research and discovery—and in the "pure" sciences at that. Such mammoth modern industries, employing millions of men and billions of capital, as automobiles, oil, aviation, radio, are with us today because research scientists during the nineteenth century made "useless" basic discoveries in the laboratory. It would be suicidal, the English science leader thinks, to follow the oft-repeated suggestion to declare a "research moratorium."

Science News Letter, November 30, 1935

ASTRONOMY

Midnight Solar Eclipse

Alice-in-Wonderland Phenomenon Ends on Christmas, Begins Day Later; Can be Seen Best at South Pole

By JAMES STOKLEY

THE MOST surprising astronomical event of the month is an eclipse of the sun that ends on Christmas day, begins the day after (no, this is not a typographical error), and is seen at its height at midnight! Unfortunately, no one in the United States will have the privilege of seeing this strange sight. From the southern part of South America, New Zealand, and Antarctica it will be observed, as a partial eclipse, with the moon only partly covering the sun.

At no place will the sun be wholly covered, for this eclipse is not total, but annular. That is, it occurs when the moon is nearly at its greatest distance from earth, and its apparent size is a little less than that of the sun. Therefore, even where it can be seen to come directly in front of the sun, that body will not be hidden. Around the dark disk of the moon will be seen a ring of sunlight, called the annulus. Such annular eclipses are of no scientific importance, because even the ring of the sun's disk that remains in view gives enough light to prevent any of the observations for which astronomers sometimes travel thousands of miles at the time of a total eclipse.

Near South Pole

This is rather fortunate, for astronomers would have a difficult time reaching it. They would have to be polar explorers as well if they wanted to see it, for the line of the central eclipse (where the moon comes exactly in front of the sun) passes within about 150 miles of the South Pole. This is the middle of the six months of day at the South Pole. It happens that at the point where the eclipse is at its height it will then be visible to the south, directly over the pole. At no place along the path will it occur at noon, as usually happens with a solar eclipse.

The paradoxical behavior of the eclipse in apparently ending before it starts is a result of the way that time is measured from the International Date Line. The line joining the centers of sun and moon, which traces out the path of the

central eclipse, will first touch the earth on Christmas day, at 12:18 p. m., Eastern Standard Time. It will leave the earth at 1:41 p. m., the same afternoon. But the point where it first touches, South Australia, is close to the Date Line, which nearly corresponds to the 180th meridian of longitude, and passes over the western Pacific Ocean. Each new day begins at the Date Line, and then travels eastwards around the earth. Consequently, at the place where the annular eclipse begins, it has already passed, and there it is 2:18 a. m., on the 26th, according to local clocks, if there happen to be any in that inhospitable region. The central eclipse only lasts an hour and 23 minutes, so it ends at 1:41 p. m., Eastern Standard Time, on Christmas afternoon. The point where it leaves the earth is about 1,300 miles south of the Cape of Good Hope, so it has gotten far ahead of the new day. At that point it will still be Christmas evening, 8:21 p. m. local time.

Seventh This Year

This eclipse will be the seventh of the year, and the fifth of the sun. No more can occur in one year. Not until 1982 will there again be seven eclipses, but then three will be of the moon and four of the sun.

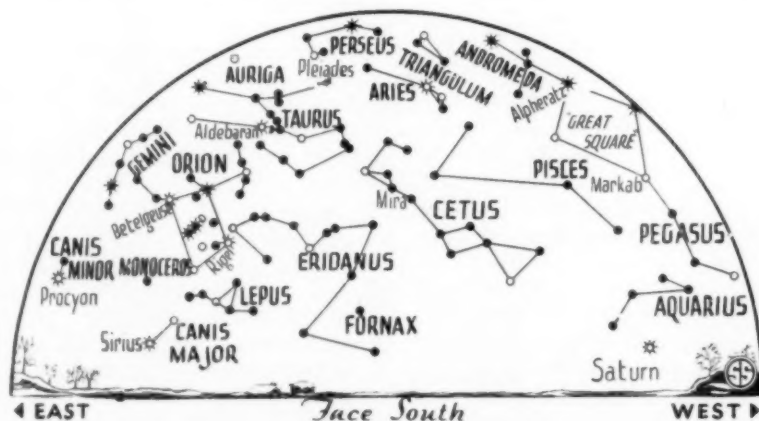
Since a solar eclipse can only occur

when the moon is new, this phase will occur on the 25th. First quarter comes on the third, full moon on the 9th and last quarter on the 17th, as indicated on the table below. Twice during December will the moon be in perigee, the point in its orbit where it makes the closest approach to earth. On the 5th, at 5:06 p. m., it will be 228,950 miles from us. Then it will recede to apogee, its greatest distance, on the 17th at 4:57 p. m., when it will be 251,300 miles off. Approaching, it will again come to perigee on the 30th, its distance then being 229,500 miles.

Only One Planet

Though the brilliant stars of winter are now coming into the evening skies, all but one of the planets have departed from it. Only Saturn, 585,440,000 miles away on December 15, remains in view, in the constellation of Aquarius. This group is low in the southwest for the time that the accompanying maps are prepared: 10:00 p. m., on the first, 9:00 p. m., on the 15th and 8:00 p. m. on the 31st. Earlier, however, just after sunset, Mars may be glimpsed still lower, in Capricornus, and may be identified by its red color. It is quite faint, for a planet, because it is now getting very far away; 177,240,000 miles at the middle of the month.

☼ * ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



EASILY FOUND

Orion, with the three bright stars in a row forming his belt, is the most conspicuous constellation of December evenings.



LOW IN THE NORTH

The familiar dipper and bright Vega are now seen close to the horizon.

Orion is the most conspicuous constellation of December evenings. It is seen in the southeast, and the three stars in a row, forming the warrior's belt, make it easy to find. Betelgeuse, in one of his shoulders, stands to the north, and Rigel, in his foot, about an equal distance to the south. Below him is one of his dogs, Canis Major, marked by brilliant Sirius, brightest star of the sky. About as high above the horizon, almost directly east, is the other dog, Canis Minor, with Procyon. Higher, and still farther north, are the twins, Gemini, with Castor above, and the brighter Pollux below.

Directly above Orion is the bull, Taurus, which he is supposed to be striking with an upraised club. The ruddy Aldebaran marks the animal's eye, the V-shaped group of which it is part—the Hyades—his face, and the Pleiades, a little cluster of stars over them, the shoulder. Above the twins is Auriga, the charioteer, in which is found the first magnitude Capella, a star that very closely resembles the sun. Low in the northeast is Ursa Major, the great bear, of which the big dipper is part.

Taurus, the Bull

Turning to the western sky again, Vega, in Lyra, can be seen just above the northwestern horizon. Next to it, on the left, is the swan, Cygnus, otherwise known as the northern cross. The cross is now vertical, and the bright Deneb marks its top. High in the west is a group of four stars that makes an excellent guide from which to locate other constellations. This is the Great Square of Pegasus, standing on one corner. The three lower stars are part of Pegasus, the winged horse, but the uppermost one is Alpheratz, in the neighboring figure of Andromeda, the princess who was chained to the rock. Just

north of Andromeda, very appropriately, is her mother, Cassiopeia, a group shaped like the letter W. Between Cassiopeia, and the Pleiades, is Perseus, the hero who rescued Andromeda, according to the mythological story.

Another planet decorates the eastern morning sky just before sunrise. This is Venus, now the "morning star," which rises about four hours before the sun. It is in the constellation of Virgo, and on the first of December is just north of the star Spica, so that the two will make an interesting pair, though the star is much fainter. The magnitude of Venus is minus 3.8, and on the 15th it is 81,582,000 miles from the earth.

Towards the end of the month, Jupiter will also become a morning star, rising in the constellation of Scorpius, as the twilight gives way to the sunrise itself. On the 15th this planet will be 585,440,000 miles distant. The remaining naked eye planet, Mercury, is now so close to the sun that it will not appear at all during the month.

The moon is at first quarter on Dec. 3, 2:28 a. m.; full on Dec. 9, 10:10 p. m.; at last quarter on Dec. 17, 4:57 p. m.; and new again on Christmas at 12:49 p. m.

Science News Letter, November 30, 1935

● RADIO

Tuesday, Dec. 3, 4:30 p. m., E.S.T.
AMERICA 8,000 B.C., by Edgar B. Howard, University Museum of the University of Pennsylvania.

Tuesday, December 10, 4:30 p. m., E.S.T.
PURE WATER, by Dr. Henry B. Ward, Permanent Secretary, American Association for the Advancement of Science.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.

ARCHAEOLOGY

City Built Over Caves
To be Explored in Mexico

ONE OF Mexico's strangest Indian cities—a city that stood on a mountain-top and used caves underfoot for its mysterious subterranean halls—is to be explored by Mexican archaeologists, beginning this month.

The ruined city is called Xochicalco, meaning Flower-House Place. Although only 60 miles south of Mexico City, it has eluded scientific study because of its isolation, which a new road to the summit now ends.

Brush-clearing activities on the flat top have already brought out ancient streets, house foundations, rooms, and other suggestions of city plan. The ruins have long been distinguished by a handsome sculptured pyramid of great undulating feathered serpents.

In the heart of a grottoed limestone region, Xochicalco has under its foundations eerie caves which the ancient inhabitants made into vast interior halls. The entrances were left at crawling height, supposedly for easy defense. Xochicalco also had man-made subterranean chambers, stone-lined, and resembling big narrow-necked bottles. Some archaeologists believe these were underground astronomical observatories for watching star movements and for calculating time.

Much interest attends the excavations, because the city is recognized a key spot in Mexico's unknown ancient history. On walls of the bird-snake pyramid, sculptured priests sit precisely like gods on Mayan Indian temples far to the south. Hieroglyphic writing on this pyramid closely resembles that found at Monte Alban, ancient city half-way south to the Mayan zone. The meaning of these relationships will be sought.

The excavations are part of a long-time research plan of Mexican government archaeologists. By thoroughly studying representative sites, they aim to determine the exact nature of the Mayan and Toltec civilizations of ancient Mexico, and to trace their relationship by excavating ruins that lie between, such as Monte Alban and Xochicalco.

As part of this project, excavations have been resumed at El Tajin, where ruins of an advanced culture lie in the lowland jungle of Vera Cruz. A more primitive site in the north-central state of Zacatecas, called La Quemada, will be worked at in the hope of finding out how far north the Toltec nation spreads.

Science News Letter, November 30, 1935



MACHINE WITH A MEMORY

Dr. A. W. Hull, of the General Electric Research Laboratory, demonstrated to the meeting of the National Academy of Sciences a machine capable of recording lightning, before, during and after the stroke. The machine with "premonition" or "memory" is also used in studying the failure of electronic tubes.

PHYSIOLOGY

Scientists Experiment With "Brain Waves" in Hypnosis

WITH eyes wide open, a hypnotized person can be persuaded that he sees nothing, and the minute electric waves that are constantly being produced by his brain will respond to the hypnotist's suggestion. They appear in the same ten-cycle pattern they have when the subject is in his normal state with his eyes closed. But only by the strongest kind of suggestion can the brain waves be changed from the "open-eye" to the "shut-eye" pattern.

This was one of the curious phenomena of the relatively new field of brain potential research reported at a conference of leading neuro-physiologists and other scientists held in Tuxedo Park, N. Y., at the private laboratory of Dr. Alfred L. Loomis. The research was conducted jointly by Dr. Loomis, Prof. E. Newton Harvey of Princeton University, and Garret Hobart of the Loomis Laboratory staff.

The brain potentials, or "waves," run along quite steadily at the rate of about ten a second, while a person sits or lies

quietly with eyes closed, but still awake. Their pattern changes when he falls asleep, and the ten-a-second rhythm is suppressed if he opens his eyes and looks at any definite object, or if he indulges in concentrated imagination or thought while he still has his eyes closed. It was found exceedingly difficult to produce the ten-cycle pattern in the hypnotized man so long as objects were registering on his eyes, even though he could no longer "see" them.

In the same series of experiments, a young musician, blind since his birth, was also tested. His reactions were found to be no different from those of persons with normal sight.

Science News Letter, November 30, 1935

The picture of a star within the crescent moon may be art but it is not nature, an astronomer writing in *Natural History* points out, for all the stars are more distant than the moon, and so cannot appear in front of its darkened face.

PHYSICS

Machine With a Memory Records Lightning Strokes

A ROBOT machine with a memory, and which almost approaches the ideal of having a premonition of when lightning will strike, was demonstrated to the meeting of the National Academy of Sciences.

The machine, called a memory oscillograph, was described by Dr. A. W. Hull, assistant director of the General Electric Research Laboratory, Schenectady, N. Y.

"In recent years," Dr. Hull declared, "engineers have succeeded in developing lightning recorders with a reaction-time of less than a millionth of a second. Even this is scarcely short enough. The ideal would be a negative reaction-time, i.e., a device which should have a premonition of when the lightning is going to strike, and begin recording ahead of time. Such a device would be able to report the whole story of events before, during, and after the stroke.

"Impossible as it may sound, this feat has been accomplished. The new electrical detective, whose name is 'memory oscillograph,' may be depended upon to be on the job and ready with pencil and paper 1/25th of a second before the lightning strikes. As its name indicates, it uses memory as a substitute for pre-science."

The apparatus is put on its job, Dr. Hull explained, some time ahead—hours, or even months—and records continuously what happens in its electrical circuit. It goes on erasing as fast as it writes, except for the last few lines.

When, at length, an important happening occurs like a lightning stroke, auxiliary apparatus, consisting of magnets and suitable vacuum tubes, opens a camera shutter and takes a picture of what is written on the oscillograph screen. The equipment does not need to hurry especially.

The records written just before the event are not yet erased, and the camera records the event as it does those later events.

"The 'memory oscillograph' is a very simple device," said Dr. Hull. "The robot which writes the record is a cathode-ray tube; its pencil a beam of cathode rays; its slate a plate covered with a thin coating of phosphorescent mineral called Willemite, which glows with a brilliant green light when the cathode rays fall on it, and continues to glow for about 1/25th of a second. That is the memory."

Science News Letter, November 30, 1935

A handy way to provide for many CHRISTMAS gifts now

*Here is an ideal
\$1.00 gift*

*Seventeen issues—nearly one third
of a year—of SCIENCE NEWS LETTER*

**Send this coupon
to SCIENCE NEWS
LETTER . . .
Washington, D. C.
You can pay
for the gifts
in January, 1936**

Send to

SCIENCE NEWS LETTER
2101 Constitution Avenue
Washington, D. C.

This order is from:

YOUR
NAME

STREET
ADDRESS

CITY AND
STATE

Kindly send seventeen is-
sues of SCIENCE NEWS LET-
TER to each of the following,
starting with the issue for
Christmas week, and bill me
at \$1.00 each, in January,
1936. 352

NAME

STREET
ADDRESS

CITY AND
STATE

. . .

NAME

STREET
ADDRESS

CITY AND
STATE

. . .

NAME

STREET
ADDRESS

CITY AND
STATE

. . .

NAME

STREET
ADDRESS

CITY AND
STATE

over

*This Coupon is
continued from
the other side*

NAME

STREET
ADDRESSCITY AND
STATE

. . .

NAME

STREET
ADDRESSCITY AND
STATE

. . .

NAME

STREET
ADDRESSCITY AND
STATE

. . .

NAME

STREET
ADDRESSCITY AND
STATE

. . .

NAME

STREET
ADDRESSCITY AND
STATE

. . .

NAME

STREET
ADDRESSCITY AND
STATE

**Mail this Coupon
to Science News
Letter, Washington**

MEDICINE

Scientists Divided on Value Of Paralysis Vaccines

SCIENTIFIC opinion on the value and safety of vaccines for infantile paralysis is sharply divided, it appears from discussions at the meeting of the American Public Health Association, Southern Branch.

Is it safe to inject some of the active, living virus of the disease into a child's body, even if the virus has been weakened so that a larger dose of it does not produce paralysis in monkeys? Does it do any good to inject doses of dead virus?

Parents and physicians all over the country are anxious to know the answers to these questions. So far, scientists have not agreed, and from the discussions it appears that the question cannot be settled without much more extensive researches.

Disappointing results were obtained with the trial of the dead virus vaccine in last summer's epidemic of infantile paralysis in North Carolina and Virginia, because the trial proved nothing either for or against the vaccine.

The North Carolina test was made on 1,452 children, Drs. A. G. Gilliam and R. H. Onstott of the U. S. Public Health Service reported. These children were nearly of the same age, had equal chances of being exposed to the disease, and were children whose parents wanted them vaccinated in order to protect them if possible against the epidemic in the vicinity. They were divided impartially into two groups. All the children in one group, 458, were vaccinated with dead virus vaccine prepared by Drs. William H. Park and Maurice Brodie of the New York City Health Department laboratories. The other children who did not receive the vaccine served as controls, to show whether those protected by the vaccine had any better chance of escaping the disease than those not so protected.

No Cases

"No cases of poliomyelitis were reported in any of the 1,452 candidates and hence no conclusions concerning the efficacy of the vaccine can be reached from this study," Dr. Gilliam said. The study was carried out under the supervision of Dr. J. P. Leake, medical director, U. S. Public Health Service.

It would be necessary to vaccinate 10,000 children and have 10,000 controls

under conditions like those of this particular trial, to show conclusively the value of a perfect vaccine against infantile paralysis, Dr. Gilliam said. If the vaccine were only 80 per cent. effective, a total of 40,000 children would have been necessary.

Further trials of this vaccine are contemplated by Drs. Park and Brodie. Although some scientists hold that dead virus vaccine cannot produce immunity or resistance to infantile paralysis, Drs. Park and Brodie reported they had found "antibodies," substances they believe indicative of immunity, in the blood of children vaccinated by their method.

Living Virus

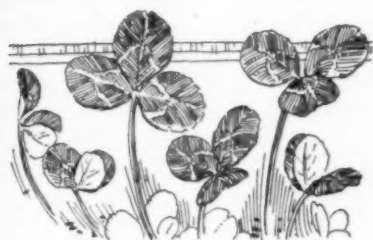
Another kind of vaccine, made of living virus weakened by chemical and other treatment, has been given to over 10,000 children, Dr. John A. Kolmer, Research Institute of Cutaneous Medicine, Philadelphia, reported. Ten of these children subsequently contracted the disease, five of them dying of it. Dr. Kolmer believes this was because they were already infected before they received the vaccine, and that it was given too late to prevent the onset of the disease. None of these ten children received the full three doses which he considers necessary for full protection.

Other scientists, skeptical of the safety of injecting living virus, see in these ten cases confirmation of their doubts and consider Dr. Kolmer's vaccine unsafe.

Hope that satisfactory vaccine will eventually be developed for protection against virus diseases, such as infantile paralysis, was expressed by Dr. Thomas M. Rivers, Rockefeller Institute for Medical Research, New York. Dr. Rivers pointed out the many difficulties in the way of developing such vaccines, difficulties due to the different behavior of viruses and to insufficient understanding of them at present.

Science News Letter, November 30, 1935

Ginger ale and soft drinks that contain caffeine must be plainly so marked, the U. S. Food and Drug Administration has warned manufacturers, citing the wide use of these beverages by children and sick persons who desire a refreshing drink—not a stimulant.



Low-Grade Ores

WHEN a man-made ore-reducing plant succeeds in paying its way by getting gold out of rock where its presence is measurable in dollars per ton, we pat the inventors and engineers on the back, give them medals and honorary degrees, and maybe even let them keep some of the money for themselves.

Yet plants and animals every day work lower-grade ores than any industrial establishment would ever dream of tackling. They make their livings that way, and they even have so much surplus that man and his hungry-mawed livestock can appropriate large chunks of the products of their living laboratories.

In the soil, potash, nitrates, phosphates and the other minerals needed by plants exist in minute quantities expressed usually as a few parts per million. Yet plant roots can take in huge quantities of soil water containing this exceedingly thin stuff, and the plants' protoplasm extracts from it as much as it needs for its own purposes. So successful is this living extraction process that when we want to replenish worn-out soils with concentrated fertilizers containing the lost elements, we most commonly use the remains of dead plants or animals, either recent or fossil.

But this successful concentration of thin solutions of mineral salts is only an incident in the life of the plant, which has to make its real foodstuffs out of water and thin air—out of a gas that exists in the air only as a small fraction, carbon dioxide. Again the protoplasm, in its specialized bits known as chloroplasts, manages somehow to catch and hang onto this thinner-than-thin stuff, enslave sunbeams to tie it to pieces of broken water molecules, and eventually turn it into carbohydrates and oils. With nitrates added from the soil solution, proteins also are formed.

Animals do not concentrate minerals and foodstuffs directly from soil water and air, as plants do, but they can take some of the partly concentrated stuffs made by the plants and perform some very creditable jobs of further concentration upon them. In an animal's bones, for example, there is a far higher concentration of lime and phosphorus than one commonly finds in plants. The animal has eaten plants containing these

minerals and raised the concentration higher. That is why we use bonemeal for a phosphate fertilizer, rather than any plant stuff.

Again, animals eat the starches and sugars, and even the celluloses of plants and concentrate parts of them into fats like butter, lard and bacon, which have a markedly higher energy content per pound than the stuffs out of which they were made.

Science News Letter, November 30, 1935

First Glances at New Books

Additional Reviews
On Page 352

Photomicrography

PHOTOMICROGRAPHY, 13th ed.—*Eastman Kodak Co.*, 121 p., \$1. This new edition represents a considerable advance over the twelfth, both in methods and mechanisms described, and in the makeup and appearance of the book itself. There should be a copy of this handy manual in every laboratory where microscopic work is carried on.

Science News Letter, November 30, 1935

Chemistry

GENERAL CHEMISTRY FOR COLLEGES—Herman T. Briscoe—*Houghton Mifflin*, 872 p., \$3.75. Prof. Briscoe has prepared a very comprehensive text in elementary college chemistry which should serve the needs of those teachers who want more material than is commonly provided in the usual textbook. Containing too much information to be given in a normal one-year course, the various chapters are so arranged that almost any type and length of course can be presented. Good typography, many diagrams and scores of industrial pictures add readability to the other merits of the book. A ten-page index is provided.

Science News Letter, November 30, 1935

Herpetology

A CONTRIBUTION TO A KNOWLEDGE OF THE HERPETOLOGY OF A PORTION OF THE SAVANNA REGION OF CENTRAL PETEN, GUATEMALA—L. C. Stuart—*Univ. of Mich. Press*, 65 p., 50c.

Science News Letter, November 30, 1935

Biology

THE DARTERS OF THE GENERA HOLOLEPIS AND VILLORA—Carl L. Hubbs and Mott D. Cannon—*Univ. of Mich. Press*, 100 p., 50c.

Science News Letter, November 30, 1935

History

COFFEE: THE EPIC OF A COMMODITY—Heinrich E. Jacob—*Viking*, 296 p., \$3.50. Fascinatingly written and ably translated (by Eden and Cedar Paul), this book tells the story of coffee from

its first appearance as "Islam's wine" a thousand years and more ago, down to its present state as one of the major economic factors (and hence troubles) of the modern world. The illustrations are numerous, well chosen, well reproduced.

Science News Letter, November 30, 1935

Marine Biology

WATER PEOPLE—Wilfred Swancourt Bronson—*Wise-Parslow*, 104 p., \$1. Fishes and other water creatures, fascinatingly pictured and entertainingly written up. If you have any bright youngsters of eleven or twelve or older on your Christmas list, here is a sure-to-please present. The growing army of Bronson "fans" will buy, regardless of their ages.

Science News Letter, November 30, 1935

Botany

AN ILLUSTRATED MANUAL OF PACIFIC COAST TREES—Howard E. McMinn and Evelyn Maino—*University of California Press*, 409 p., \$3.50. The native and introduced trees of California, adequately described and illustrated, with suggestions regarding their horticultural, agronomic and industrial uses. An exceedingly useful appendix condenses this latter information into groups of trees classified according to uses.

Science News Letter, November 30, 1935

A SERVICE FOR ORGANIZATIONS
AND INDIVIDUALS
SUPPLYING

SCIENTIFIC and TECHNICAL INFORMATION

References to published literature. Lists
of current articles. Translations. Research
assistance.

Correspondence Solicited.

THE TECNA COMPANY

Room 404, 200 Broadway
New York, N. Y.

•First Glances at New Books

Additional Reviews
On Page 351

Current History

RIVALRIES IN ETHIOPIA—Elizabeth P. MacCallum—*World Peace Found.*, 64 p., 50c. There is a far-reaching background to the present controversy over Ethiopia. The economic and political situation involving the British, French and Italian penetration into Ethiopia during several decades is set forth in this factual study.

Science News Letter, November 30, 1935

Endocrinology

GLANDS AND EFFICIENT BEHAVIOR—Florence Mateer — *Appleton-Century*, 243 p., \$2.50. The use of many illustrative case histories makes this book extremely readable and will probably achieve its author's object of impressing parents, teachers and physicians with the way in which gland therapy can improve many a child's behavior.

Science News Letter, November 30, 1935

Photography

PROFITABLE ENLARGING AND THE MINIATURE CAMERA—H. Rossiter Snyder—*Rossiter Snyder Pub. Co.*, 40 p., 50c. Tenth in a series of booklets telling how to make money out of photography. What to photograph and how to dress it attractively for sale are but two of the items disclosed. Many ifs and ands about the subject of miniature photography are given. It is not all snapping the shutter.

Science News Letter, November 30, 1935

Music—Electricity

A FUGUE IN CYCLES AND BELS—John Mills—*Van Nostrand*, 269 p., \$3. In his lucid style, Mr. Mills tells how science has brought music to large audiences through electrical amplifying systems and to millions through the radio. More than that, he tells how science is actually changing music and bringing in new musical techniques.

Science News Letter, November 30, 1935

Engineering

THE REFRIGERATING DATA BOOK AND CATALOG—*American Soc. of Refrigerating Engineers*, 576 p., \$3.50. The refrigerating equivalent of the Handbook of Chemistry and Physics, now in second edition.

Science News Letter, November 30, 1935

Philosophy of Science

PHILOSOPHY AND THE CONCEPTS OF MODERN SCIENCE—Oliver L. Reiser—*Macmillan*, 323 p., \$3.50. Highly stimulating is this synthesis of science and

philosophy. Relatively new ideas in physical and natural science, born largely of the impact of the new physics upon modern thought in other branches of science, are set forth with a breadth and background that are very useful. In the second part, which considers philosophy and the social sciences, emphasis is put upon the idea that human history can be interpreted in terms of the amount of energy available. The closing chapter analyzes humanism as a new religion or philosophy based upon the concepts of modern science.

Science News Letter, November 30, 1935

Chemistry

THE OPTICAL BASIS OF THE THEORY OF VALENCY—R. de L. Kronig—*Macmillan*, 246 p., \$4.50. A highly technical book for those chemists who are band spectroscopists. He collects the research in physics relating to valence and chemical binding as gleaned from band spectrum experiments. It is valuable in its field, but tough going, for those who are not specialists in spectroscopy.

Science News Letter, November 30, 1935

Biology

GENETIC VARIATIONS IN RELATION TO EVOLUTION—H. S. Jennings—*Princeton Univ. Press*, 138 p., \$2. Some of the newer things in genetics, discussed in their bearing on the problems of evolution by a veteran investigator in this field who, however, knows how to present his facts and interpretations in such a way that any fairly well educated person can grasp them.

Science News Letter, November 30, 1935

Biophysics

BIODYNAMICA — edited by Basile J. Luyet—*Normandy, Mo.*, \$1.50 per volume. This recently established journal, devoted to "the elaboration and the experimental study of working hypotheses on the nature of life," is published on a unique plan: it is not issued at regular intervals, but as material develops—about 100 pages a year. Recent contributions have concerned themselves with the specific gravity of protoplasm, ultraviolet absorption by protozoan cells, the specific heat of erythrocytes, and kindred subjects.

Science News Letter, November 30, 1935

Paleontology

THE BOOK OF PREHISTORIC ANIMALS—Raymond L. Ditmars—*Lippincott*, 64 p., \$2. Saurians, mastodons, titanotheres, the whole lumbering world of animate antiquity interestingly presented by Dr. Ditmars, and as interestingly pictured by Helene Carter. A feature of especial excellence is the setting of the animals of various geological ages on two-page picture-maps of the continents as they then were. This is a device that might profitably be adopted in much more formal treatments of historical geology.

Science News Letter, November 30, 1935

Medicine

FREE MEDICAL CARE — SOCIALIZED MEDICINE—E. C. Buehler—*Noble and Noble*, 360 p., \$2. One of the volumes in the University Debaters Help Book Series, this should ably fulfill its purpose of aiding those who support either side of the subject in a debate. Definitions of terms, briefs of both affirmative and negative arguments, bibliography and reprints of numerous articles by authorities on both sides of the question are included.

Science News Letter, November 30, 1935

Astronomy

ASTRONOMY—Arthur M. Harding—*Garden City Publ. Co.*, 418 p., \$1.98. Written in very elementary terms, employing an easy, chatty style, with the subject matter broken up into very short paragraphs, this book should appeal very strongly to younger readers—though it is in no sense "written down" for any set age level and can be read with much pleasure and profit by older persons as well.

Science News Letter, November 30, 1935

Physiology

A TEXTBOOK OF PHYSIOLOGY—William D. Zoethout—*C. V. Mosby Co.*, 694 p., \$4. Fifth edition of a text designed for students in dental, pharmacy and normal schools, who have not too much time to devote to the subject. In this edition there is much new material, especially on the hormones, vitamins, muscles and nervous system.

Science News Letter, November 30, 1935

Science News Letter will secure for its subscribers any book or magazine in print which was published in the United States. Send check or money order to cover regular retail price (\$5 if price is unknown, change to be remitted) and we will pay postage in the U. S. When publications are free, send 10c. for handling. Address Book Dept., Science News Letter, 2101 Constitution Avenue, Washington, D. C.